

# Semiconductor Detector End-to-end Simulations with Allpix Squared: Latest Features, Ongoing Developments, and Application Examples

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Allpix Squared is a versatile open-source simulation framework for semiconductor detectors, and was presented at the last DRD3 week. The framework enables detailed end-to-end simulations of pixellated sensor setups for several detector types, semiconductor materials, and geometries for a variety of applications. It also takes advantage of multi-processor architectures for fully parallel event simulation.

The framework holds a curated interface to Geant4 for describing the interaction of particles with matter, various algorithms for charge transport in the sensor, and digitisation of the signals in the front-end electronics. A new interface to SPICE is being developed for more sophisticated front-end simulations, and detailed field, potential, and doping maps can be imported from TCAD simulations to accurately model the motion and recombination behaviour of charge carriers.

In addition, new physical models such as impact ionization and trapping have been integrated. Simulation of gain layers and 3D sensors are possible, and actively used in the community.

This contribution will highlight recent additions, ongoing developments, and application examples. A selection of simulations carried out with the framework will be shown to demonstrate its versatility and predictive power, and its ongoing usage in a DRD3 context.

## Type of presentation (in-person/online)

online presentation (zoom)

## Type of presentation (I. scientific results or II. project proposal)

III. other (please specify)

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